ChatGPT and Generative AI: Environmental Impacts on Water Resources

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The world has become driven by technology in all forms. Mobile phones revolutionized the way people communicated, and X-rays reshaped the methods in which hospitals care for patients. For better or worse, humans grow and advance with every new discovery. Nevertheless, generative artificial intelligence, gen AI, has become one of the most prominent technological breakthroughs in history. The vast array of uses this innovation provides is beneficial to every audience, whether it be consumers, healthcare providers, or businesspeople. Naturally, it is used on a global scale. Even so, those who use generative AI must acknowledge that the water consumption requirements to maintain its upkeep, growth, and accessibility are detrimental to natural water supplies.

Cole Stryker and Mark Scapicchio of IBM provide an excellent overview of how gen AI works in "What is generative AI?" This type of artificial intelligence relies on deep learning models. These models replicate the human learning process. They are composed of virtual neural networks that sift through data to identify patterns and relationships. Thus, users of gen AI engines find tailored responses built by analyzing data from millions of people. New types of content are at gen AI's disposal with every new user request. ChatGPT, released in 2022, is one of the most iconic and prevalent examples of this capability (Scapicchio & Stryker, n.d.). The benefits of generative artificial intelligence are vast. According to Harvard University Information Technology's "Ideas for experimenting with Generative AI: Use cases and things to keep in mind," there are levels to AI integration. Developers can use AI-

generated content to fine-tune, review, and generate code. Language barriers can be broken by gen AI's translation capabilities. Applications can tailor gen AI to their own unique purpose to boost productivity (Harvard University, 2023). A far more intriguing integration is described by Shiva Maleki Varnosfaderani and Mohamad Forouzanfar in *The Role* of *AI in Hospitals and Clinics: Transforming Healthcare in the 21st Century*. The deep learning models are effective for decision-making algorithms. Hospitals have recognized this and utilized the function to assist with their diagnosis and prognosis. This expands providers' ability to perform accurate medical diagnostics and provide effective treatment plans. This optimization is due to the learning model's ability to sort medical patient data to pinpoint patterns between ailments, symptoms, and genetics (Forouzanfar & Varnosfaderani, 2024). Despite all these benefits, the impact gen AI has on water resources is substantial. In Increasing *Water Stress in Urban India: Impact of AI, LLMs and High-powered infrastructures*, Prof. Mandira Dutta and Nirmalya Shome explain the impact's source in detail. Data centers are locations with servers that store substantial amounts of data. AI data centers store all the information generative AI engines collect from their users, which is what deep learning models rely on. The true issue lies within the immense amount of heat that data centers' hardware generates. For larger AI enterprises such as ChatGPT, air cooling can no longer mitigate the heat; instead, water cooling must be adopted. Data centers cannot reuse water. Recycled water can cause corrosion or bacterial growth, and its purification is extremely expensive. Consequently, new batches of water must continuously be collected. (Dutta & Shome, 2025). "Making AI Less 'Thirsty,'" by Pegfei Li et al. provides an excellent overview of gen AI's water consumption through metrics. As of 2023, depending on location and time parameters, a user can request medium-length responses from ChatGPT-3 10-50 times per 500 mL of water. Furthermore, according to a recent U.S data center energy report, it is estimated that by 2028, the total onsite AI data center water usage could double or even quadruple. That equates to 150-280 billion liters of onsite water usage (Li et al., 2025). ChatGPT gets upgraded constantly, and its userbase grows every day. Consequently, its need for water increases on a regular basis. Water is a finite resource that is needed for agriculture, community survival, and many other important things that contribute to

society's survival. Generative AI data centers take considerable quantities of the water that is important to be dispersed among activities that maintain society's livelihood.

Overall, the current state of the world, driven by technology, has created numerous innovations, like mobile phones or X-rays, which have improved many lives. Among these advancements, generative AI stands out as one of the most prevalent. It is beneficial for all types of people, including businesspeople, healthcare providers, and everyday consumers. Even so, due to gen AI's reliance on data centers, which emit immense heat, billions of liters of water are needed to provide a cooling system. There is a finite amount of natural water that needs to be dispersed among many different purposes crucial to society's survival, and most of it is consumed by data centers needed for deep learning. Thus, users of gen AI must acknowledge that, each year, the strict, problematic water requirement grows, effectively enlarging the detriment it poses to natural water resources.

References:

1. Maleki Varnosfaderani, S., & Forouzanfar, M. (2024). The Role of AI in Hospitals and Clinics: Transforming Healthcare in the 21st Century. Bioengineering, 11(4), 337. https://doi.org/10.3390/bioengineering11040337.

2. Dutta, M., & Shome, N. (2025). Increasing Water Stress in Urban India: Impact of AI, LLMs and High-powered infrastructures. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5169784.

3. Stryker, C., & Scapicchio, M. (n.d.). What is generative AI?, Machine Learning. IBM. https://www.ibm.com/think/topics/machine-learning#7281535.

4. Harvard University Information Technology. (2023). Ideas for experimenting with Generative AI: Use cases and things to keep in mind. Harvard University. https://www.huit.harvard.edu/news/ai-use-cases.

5. Li, P., Yang, J., Islam, M. A., & Ren, S. (2025). Making AI less "thirsty". Communications of the ACM, 68(7), 54–61. https://doi.org/10.1145/3724499